

EXHIBIT 223

**IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF GEORGIA
ATLANTA DIVISION**

**DONNA CURLING, ET AL.,
Plaintiffs,**

v.

**BRAD RAFFENSPERGER, ET AL.,
Defendants.**

Civil Action No. 1:17-CV-2989-AT

**DECLARATION OF ANDREW W. APPEL
IN SUPPORT OF MOTION FOR PRELIMINARY INJUNCTION**

ANDREW W. APPEL, declares, under penalty of perjury, pursuant to 28 U.S.C. § 1746, that the following is true and correct:

1. My name is Andrew W. Appel.
2. My background, qualifications, and professional affiliations are set forth in my curriculum vitae, which is attached as Exhibit A. I have over 40 years' experience in computer science, and 15 years' experience studying voting machines and elections.
3. I am the Eugene Higgins Professor of Computer Science at Princeton University, where I have been on the faculty since 1986 and served as Department Chair from 2009-2015. I have also served as Director of Undergraduate Studies, Director of Graduate Studies, and Associate Chair in that department. I have

9. I am not being compensated for my work related to this matter. I expect that my expenses, if any, will be reimbursed.

10. I have read the Declaration of Juan E. Gilbert in this case, dated 13 November 2019. His Declaration is remarkable for what he does *not* say.

11. Between November 2018 and March 2019 I conducted a research collaboration with Professor Rich DeMillo of Georgia Tech and Professor Philip Stark of U.C. Berkeley, leading to the publication of our joint paper, “Ballot Marking Devices (BMDs) cannot assure the will of the voters,” (by Appel/DeMillo/Stark) released in April 2019. Our research analyzes the consequences of an important study by DeMillo, Kadel, and Marks released December 2018 entitled “What Voters are Asked to Verify Affects Ballot Verification: A Quantitative Analysis of Voters' Memories of Their Ballots.”

12. Professor Stark’s Declaration focuses on the scientific results of these two papers. Professor Gilbert does not attempt to rebut the key findings of these papers: BMD-marked ballots are not adequately voter-verified, and thus BMD-for-all-voters elections are not secure.

13. The DeMillo/Kadel/Marks paper describes two different studies, two separate aspects of the same question. (1) Do voters review the ballot-cards produced by BMDs before they insert those cards in the optical scanner? and (2) How much can they remember about what contests were on the ballot?

Measurements of real voters in a real polling place in Tennessee answered question 1 as, “47% of voters are seen *not to look at the paper at all*, and the other 53% look at the paper *for an average of 3.9 seconds, even though there were 18 contests on the ballot*.” Interviews with those same voters outside the polling place showed that the answer to question 2 is, “not very accurately.”

14. In our April 2019 paper we analyze the consequences of Finding 1, that most voters hardly examine the BMD-marked paper ballot at all. Finding 2 was interesting but not consequential to our analysis.

15. Our analysis asks: if few voters examine their BMD-marked paper ballots, then what? Surely *a few* voters will examine their ballot, so that if the BMDs have been hacked to steal 10% of the votes, and 10% of the voters carefully examine their ballots, and half of those voters are not too timid to alert a pollworker when they notice something wrong, then only *1 in 200 voters* will alert a pollworker. You might think, “these voters caught the BMD cheating red-handed, surely there will be consequences!” But our analysis demonstrates that there can be no consequences: the BMD will have succeeded in stealing many votes; election officials cannot invalidate elections just because a few voters claimed their ballot was wrongly marked.

16. Professor Gilbert, in paragraph 63 of his Declaration, calls the DeMillo/Kadel/Marks paper a “flawed” study, and *all* of his criticisms of it

20. This absence of rebuttal—from an expert demonstrably familiar with the substance of both papers—speaks volumes. There is a real problem with BMD-marked paper ballots: voters don’t inspect them, and if a voter says there’s an error, there’s no way to prove it.

21. In paragraphs 72-75, Professor Gilbert addresses the “Curling Plaintiffs’ Exhibit 4: Paper authored by Appel, DeMillo, and Stark.” In these paragraphs he states that he disagrees with our *policy conclusions* (that voters who can hand-mark an optical-scan paper ballot should be permitted to do so), but he does not say that he disagrees with our *scientific conclusion*: “Risk-limiting audits of a trustworthy paper trail can check whether errors in tabulating the votes *as recorded* altered election outcomes, but there is no way to check whether errors in how BMDs *record* expressed votes altered election outcomes. The outcomes of elections conducted on current BMDs therefore cannot be confirmed by audits.”³

22. In paragraph 59, Professor Gilbert is simply and obviously wrong. He is responding to Professor Stark’s statement that “Bugs, misconfiguration, or malicious hacking can cause the BMD to print something other than the selections the voter made on the touchscreen or accessible interface. Hand-marked paper ballots do not have that vulnerability.” Professor Gilbert writes, “This is simply not true.” But it very simply is true, on the face of it. Bugs, etc. cannot cause a BMD to print wrong

³ This is a direct quotation from the abstract of the paper.

hacked, they can systematically change votes from what the voter indicated on the touchscreen when printed on the paper ballot; few voters will notice, and those that notice have *only* the mitigation that they might be able to correct their own ballots, not their neighbors; and finally, recounts or audits will see only the fraudulently marked paper. This is the central point of Professor Stark's and Professor Halderman's Declarations; and Professor Gilbert avoids disputing these central facts.

A handwritten signature in cursive script, appearing to read "Andrew Appel", written over a horizontal line.

ANDREW W. APPEL

December 13, 2019
Princeton, NJ